

## **MEDICAL SUCTION NOZZLE HOLSTER**

### **BACKGROUND OF THE INVENTION**

**[0001]**      **1. Field of the Invention.**      This invention is generally concerned with holster apparatus for nozzle components of medical/dental suction devices. It is particularly concerned with maintaining sterile conditions and ready access to such devices during medical/dental operations.

**[0002]**      **2. Discussion of the Background.**      A representative prior art medical suction nozzle holster is disclosed in U.S. Patent 5,224,679 ("the '679 patent"). It teaches a medical suction nozzle holster that is designed to hold a sterile bubble wrap in which a suction nozzle was originally shipped. Thus, the sterile bubble wrap also is used to maintain sterile conditions during an operation. After the operation, the bubble wrap (now holding bodily fluids) is then removed from the holster and sent to a sanitary disposal point.

**[0003]**      Such uses of the bubble wrap in which a suction nozzle was originally shipped have not, however, met with wide acceptance. This may follow, at least in part, from the fact that the packaging requirements for such nozzles are somewhat at odds with the use requirements of such nozzles. For example, nozzle manufacturers often prefer to package their nozzles in plastic packaging materials that are relatively hard so that they will resist accidental penetration of the shipping package walls - and hence loss of their sterile conditions. Such shipping packages must also be capable of being easily broken

open, by hand. These requirements are such that a broken open, relatively hard plastic package is not particularly well suited to (1) being easily loaded into a nozzle holster, (2) maintaining a relatively soft compression type grip on a suction tube placed in a relatively hard (and hence inflexible) wrapper and (3) being readily tightly resealed for sanitary disposal purposes.

### **SUMMARY OF THE INVENTION**

**[0004]** This invention addresses these problems by providing a medical suction nozzle holster apparatus with a cooperating array of individual sterile sacs. These sacs have walls that are made of relatively soft plastic sheet materials (relative to the harder, more rigid plastic shell materials in which such nozzles are often packaged). Applicant's cooperating array of individual sterile sacs may, for example, take the form of a cooperating array of individual sterile sacs that are soft enough to be wound in a continuous or semi-continuous roll. A continuous roll can be constructed such that a perforated line is created between each successive sac on such a continuous roll so that successive sacs can be readily removed from the roll after each sac is used. A semi-continuous roll can be created by having a trailing portion of a first sac folded into a folded portion of a leading portion of a second sac - and so on, to create a roll of such interfolded sacs. By way of another example of a cooperating array of individual sterile sacs, a series of individual sterile sacs can be nested (one inside another, to form a nested array of said sacs) in a manner such that a "used" sac (i.e., one in which a used nozzle has been holstered) can be removed from the nested array for disposal and thereby exposing the next sterile sac in the nested array for use with respect to a next, as yet unused, nozzle.

**[0005]** The holster apparatus of this patent disclosure are also preferably provided with suitable devices for holding their cooperating array of individual sterile sacs in the holster during an operation, but then allowing successive sacs to be separated from the next sac in that array. By way of example only, a leading edge region of each sterile sac in a roll of such sacs may be provided with one or more holes. These holes are adapted and arranged to receive certain hereinafter more fully described knob-like or hook-like devices located on the outside wall of applicant's holster, near their top opening.

Other sterile sac holding devices such as biased clamps (e.g., spring loaded clamps) may be used for this sac-holding function. Still other sterile sac holding devices will be provided with means for sealing the sac in order to dispose of its contents in a sanitary manner. Sac closing devices such as so-called Ziploc® and Velcro® strips, may be employed for this purpose as well.

**[0006]** Such holster apparatus also are preferably provided with a device for rotating the holster with respect to its mounting device - and, hence, with respect to the stable object to which the mounting device is attached. Such a mounting device will normally be a clamping device that attaches to a bar of an operating table or the like. Applicant's rotatability feature allows operating room personnel to position the nozzle handle according to individual preferences. Preferably, these devices for rotating the holster may be positioned and repositioned by hand (i.e., without the aid of hand tools).

### **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0007]** Figure 1 illustrates an operating room wherein a suction nozzle holster of this patent disclosure is being employed.

**[0008]** Figure 2 illustrates the mechanical details of a representative medical suction nozzle to be held by applicant's nozzle holster.

**[0009]** Figure 3 depicts an embodiment of this invention wherein a nozzle holster is provided with a cooperating array of sterile sacs wound in a continuous roll.

**[0010]** Figure 4 depicts a continuous roll of sterile sacs being unwound.

**[0011]** Figure 5 depicts a sterile sac being separated from a subsequent sterile sac in a roll of such sacs.

**[0012]** Figure 6 is a cross section view of an embodiment of this invention showing a holster apparatus provided with (1) inwardly bias holster sidewalls, and (2) a representative clamp device for attaching the holster apparatus to an operating table side bar.

**[0013]** Figure 7 is a cross section view of another embodiment of this invention wherein a nozzle holster is provided with a nested array of sacs and an alligator jaw-like clamping device for holding the holster in place.

**[0014]** Figure 8 depicts an embodiment of this invention having a rotatable C-clamp device for positioning said holster at a desired hand access angle.

**[0015]** Figure 9 is a rear view of a holster apparatus of this patent disclosure rotated over an angle alpha ( $\alpha$ ) in order to depict more convenient hand access according to individual preferences of operating room personnel.

### **DETAILED DESCRIPTION OF THE INVENTION**

**[0016]** Figure 1 depicts an operating room 10 wherein a patient 12 lies on an operating table 14 having various bar-like structural members such as horizontal and vertical bars. Applicant's holster apparatus 18 is shown attached to one such bar-like structural member 16 of said operating table 14. This apparatus 18 is shown holstering a medical suction nozzle 20. Figure 1 also is intended to suggest that the holster 18 can be rotated in order to orient a handle portion of such a nozzle 20 to comport with the desires of individual operating room personnel such as anesthesiologists. These medical suction nozzles 20 are generally used to remove bodily fluids such as secretions, blood and/or stomach contents from a patient's throat and/or mouth so that the patient does not aspirate such fluids into his/her lungs. To this end, vacuum conditions are placed upon an inside bore of medical suction nozzles of this type. The nozzle's rearward end is shown connected to a hose 22 that leads to a fluid collection canister 24. Thus, during the course of an operation, a patient's secretions, blood and/or stomach contents can be removed from the patient's throat and/or mouth and directed to the fluid collection canister 24 for subsequent sanitary disposal.

**[0017]** Figure 2 depicts a medical suction nozzle 20 of the type generally contemplated for the practice of the present invention. It is depicted as having five portions A, B, C, D and E (also designated by lengths A, B, C, D and E) as well as several other distinctive physical features. For example, the medical suction nozzle 20 shown in Figure 2 has an opening 26 located at the front of its forward end portion A. This opening 26 leads into a bore hole 28 that extends not only through forward end portion A, but through the entire length of said nozzle 20. Vacuum conditions are placed in this bore hole 28 in order to remove undesired fluids from a patient's mouth and/or throat and then send such fluids to a fluid collection canister such as that

depicted as item 24 in Figure 1. The length of the forward end portion A of suction nozzle 20 will preferably be from about 1.5 to about 2.5 inches (with a length of about 2 inches being especially preferred). The outside diameter of this forward end portion A is generally depicted as item 20A in Figure 1. It will generally range from about 0.25 to about 0.50 inches.

**[0018]** The forward end portion A of the nozzle leads to portion B of said nozzle 20. Figure 2 also depicts how the bore hole 28 extends from portion A and on through the center of portion B in a continuous manner. In some commercially available medical suction nozzles, such a portion B will have a length of from about 1.5 to about 2.5 inches (here again with a preferred length of about 2.0 inches). The outside diameter of portion B is depicted by item 20B. This outside diameter 20B is preferably greater than the outside diameter 20A of the forward end portion A. Thus, the outside diameter of nozzle 20 tapers down as it leads from portion B to the forward end portion A. Figure 2 also depicts portion B as being oriented at an angle theta one ( $\Theta_1$ ) with respect to the forward end portion A. This angle theta one ( $\Theta_1$ ) is preferably from about 10 degrees to about 30 degrees. Thus, the front portions of nozzle 20 curve as they lead from portion B to the forward end portion A. The presence of this angle theta one ( $\Theta_1$ ) facilitates insertion of the front portion A of said nozzle 20 into a patient's mouth and throat.

**[0019]** Portion B, in turn, leads to a portion C of the nozzle 20. Preferably, portion C has a length of about 1.5 to about 2.5 inches (here again, with a length of about 2.0 inches being preferred) and an outside diameter 20C that is preferably greater than the outside diameter 20B of portion B. Portion C also is depicted as being at an angle theta two ( $\theta_2$ ) with respect to portion B. Preferably, this angle theta two ( $\theta_2$ ) is also from about 10 degrees to about 30 degrees. The presence of this angle theta two ( $\theta_2$ ) especially facilitates insertion of the front end portion A of such a nozzle into a patient's throat. Thus

the two angles, theta one ( $\theta_1$ ) and theta two ( $\theta_2$ ), create an overall angle of curvature theta three ( $\theta_3$ ) for the overall suction nozzle 20. Preferably, this overall angle of curvature theta three ( $\theta_3$ ) will be from about 20 degrees to about 60 degrees. Thus, the lengths, outside diameters and respective angles of curvature of portions A, B and C are each such that they facilitate insertion of these portions of the nozzle into the mouth and/or throat of a human being. These lengths and curvatures also serve to generally define the more preferred sizes and configurations of applicant's holster for nozzles of this kind.

**[0020]** Figure 2 depicts portion C of the nozzle 20 leading to portion D. Portion D preferably has an outside diameter 20D that is greater than the outside diameter 20C of portion C. Portion D is however specifically adapted to serve as a "handle" portion of the nozzle 20. To this end, the length of portion D will be of sufficient length to be gripped by the hand of a human being. Such a handle may for example have a length of from about 2 to about 5 inches (with a length of about 3 inches being somewhat preferred). In keeping with its function as a handle, the outside surface of portion D may be further provided with hand/finger grip aiding devices such as the ridges 30A and 30B depicted in Figure 2. The outside surface of the leading part of portion D also may be provided with indented region(s) 32A and 32B to receive a finger tip (and especially an index finger tip) and/or thumb of a human holder for more precise hand control of such a nozzle.

**[0021]** The left end of the nozzle 20 shown in Figure 2 is designated as portion E. It will normally have a length of about 1 to about 2.5 inches. This portion E generally serves as a connector device for a hose, and especially a flexible plastic or rubber hose that leads from the rear end of the bore 28 in the nozzle 20 to a fluid collection canister such as that depicted as item 24 in Figure 1. To this end, the outside surface of portion E is shown provided with a series of ridges 34 that serve to grip the inside bore of a suitably



sized, flexible hose. Such a hose also may be connected to a vacuum source (not shown). Such a vacuum source may, for example, be supplied by a component of the canister 24. Thus, bodily fluids can be collected at the opening 26 of the nozzle 20, conveyed through its bore 28, further conveyed through an attached hose 22 and delivered to a fluid collection canister 24 for subsequent sanitary disposal.

**[0022]** Figure 3 depicts a medical suction nozzle 20 temporarily residing in a nozzle holster 36 that illustrates a preferred embodiment of this invention. In this preferred embodiment, the nozzle holster 36 is shown mounted to a base plate 38 (e.g., mounted by holster bands 39A and 39B). This holster 36 is shown provided with a top opening 40 (that preferably has at least a three inch diameter and most preferably an elliptical configuration) and a bottom opening 42 (that preferably has at least a one inch diameter, and a round configuration). The nozzle 20 is shown inserted into the top opening 40 of the holster 36 to an extent such that portions A, B and C thereof generally reside in the body of holster 36 while portions D and E generally remain outside of said holster (i.e., beyond the top opening 40). For the purposes of this patent disclosure, the nozzle 20 can be regarded as "residing" or "holstered" in the holster 36 when at least a forward portion, e.g., portions A and B (but preferably portions A, B and C) are located inside of the holster's top opening 40. For the purposes of this patent disclosure, a holster's ability to receive at least portions A and B of such a nozzle, may be regarded as its ability to hold a "substantial part" of such a nozzle. Such a holster 36 also preferably has a curved configuration to generally accommodate the curved configuration of a suction nozzle such as that shown in Figure 2 (e.g., a holster having a counterpart angle  $\theta_3$  of from about 20 to about 60 degrees) . The curvature of holster 36 is preferably such that the front end 43 of the front portion A of the nozzle 20 begins to encounter resistance provided by the inside surfaces of the lower regions of said holster 36 (actually, the inside surfaces of a sterile sac

44 residing in such a holster 36) as the front end of handle portion D approaches the holster's top opening 40 and thereby bringing the handle portion D to - and holding said handle portion D in - a preferred position such that said handle portion D can be conveniently grasped by a human hand (e.g., that of an anesthesiologist). The ability of the holster 36 to put pressure upon (and therefore hold) the suction tube 20 can be increased by various means (e.g., by inwardly biasing the holster sidewalls in one or more ways). To exemplify this holding ability, the holster 36 shown in Figure 3 is shown with one or more inwardly biased tension springs 45A, 45B ... 45N that generally encompass the lower parts of the walls of such a holster 36.

**[0023]** A sterile sac 44 is shown residing in the holster 36 depicted in Figure 3. This sterile sac 44 is shown attached to another comparable sterile sac 46 which leads to yet another such sterile sac etc. in a cooperating array of such sacs generally having the character of a wound roll 48 of such sterile sacs. In one embodiment of this invention, a first sac (e.g., sac 44) has a perforated line 49 indented into its plastic material in a region that lies between the trailing edge of sterile sac 44 and the leading edge of the next sterile sac 46. This perforated line 49 allows sterile sac 44 to be torn from sterile sac 46 - and hence from the roll 48 of such sacs at appropriate times. The sterile sac roll 48 is shown mounted on a sterile sac roll axle 50 which, in turn, is mounted to a lower portion 38A of the base plate 38 to which the holster 36 also is attached. In Figure 3, the top or leading part 44A of the sterile sac 44 is shown draped over the top edge 45 of the top opening 40 in the holster 36. This top or leading part 44A of the sterile sac 44 may be further held in place by a suitable holding device such as one or more knobs, clamps or hooks. By way of example only, some representative sac-holding knobs are shown as items 88C(1) and 88C(2) in Figure 7.

**[0024]** Figure 4 is a front view of a roll 48 of sterile sacs such as that depicted in Figure 3. This roll 48 also is shown mounted on a

central axle 50. A perforated line 49 is depicted in the sac material between sterile sac 44 and sterile sac 46. This perforated line 49 is comparable to the line of perforation that separates those plastic sacs used as liners in a household trash barrel from an adjoining plastic sac in a roll of such trash barrel liner sacs. Semi-continuous arrays of such sacs can also be made by interfolding the leading/trailing portions of a series of such sacs and winding the resulting semi-continuous array into a rolled up configuration. Applicant's sterile sacs are also analogous to household trash barrel liner sacs in that they are preferably made of relatively soft (relative to certain hard plastic packages in which such nozzles are sometimes packaged) plastic sheet materials (e.g., those made of sheets of Mylar®, Cellophane® and similar cellulosic plastic materials). Preferably, the sac walls of applicant's sterile sacs will have thicknesses comparable to those of trash barrel sacs (e.g., thicknesses ranging from about 1 ml to about 4 mls). Smaller, but similar sacs are also widely used to store food in refrigerators. It also might be noted here that such refrigerator storage sacs are often provided with sac top opening sealing/unsealing devices such as so-called Ziploc® devices. Such sac sealing/unsealing devices may be used in the practice of this invention as well. By way of example, such a sealing/unsealing Ziploc® type device is depicted by items 44E in Figures 4 and 5.

**[0025]** Figure 5 depicts a first sterile sac 44 being separated from a second sterile sac 46 by a tearing action applied along a line of perforation 49 placed in the sheet-like material from which the successive sterile sacs 44, 46, etc. are made. The first sterile sac 44 is shown holding a quantity of bodily fluids 51 to be disposed of in a sanitary manner (e.g., by subsequent burning of the sac and its contents). This sterile sac 44 also is shown provided with a sealing device 44E such as a Ziploc® device. Figure 5 also suggests another preferred embodiment of this invention wherein the sterile sac 44 is of such a size that it can also be used to dispose of a used suction tube

20 (and, optionally, the suction hose 22 that was attached to said suction hose 20).

**[0026]** Figure 6 is a cross section view of another representative suction tube holster 36B shown with a representative sterile sac 44B contained therein. This sterile sac 44B has been unwound from a roll 48B of such sterile sacs and "threaded through" a bottom opening 42B in the holster 36B. The roll 48B is shown mounted on a lower portion of a holster base plate 52B by means of a roll axle 50B having a keeper 54B that prevents the roll 48B from coming off of said axle 50B during use. The holster base plate 52B shown in Figure 6 is mounted to the holster base plate 52B by means of a channel 56B which is provided with channel bolts 58B(1) and 58B(2). The sterile sac 44B is shown lining the inside walls of the holster 36B and passing up through a top opening in said holster 36B. The bottom of the sterile sac 44B is shown provided with a line of perforation 49B located between the sterile sac 44B in the holster 36B and a next sterile sac 46B that is shown just beginning to be unwound from the roll 48B of sterile sacs. A top or leading edge portion 60B of the sterile sac 44B in the holster 36B depicted in Figure 6 is shown draped over the top edge 62(B) of the top opening 64B of the holster 36B. This leading edge portion 60B of such a sac also may be provided with holes adapted and arranged to receive knobs or hooks (such as those depicted as items 88C(1) and 88C(2) in Figure 7) to hold the sterile sac 44B in place during use of the particular sac then residing in the holster 36B. This leading edge portion 60B is also preferably provided with a sac-sealing device such as that depicted as item 44E in Figures 4 and 5.

**[0027]** Figure 6 also depicts the holster 36B provided with a spring-like device 66B having coils 66B(1), 66B(2) ... 66B(N) in an inside region of a holster having an outside wall 65B(1) and an inside wall 65B(2). This spring-like device 66B is intended to very generally suggest any device (such as a coil spring) that is capable of

compressing the inside walls of the holster together in order to slidably and releasably hold the front end of a suction nozzle (e.g., the front portion 43 of the nozzle depicted in Figure 2). Again such a holding device may be an actual coil spring or some other device that serves to releasably hold the front portion A of the nozzle in place, but allow it to be withdrawn from the holster by pulling forces created by a human hand. By way of another example, an inward biasing of the material(s) used to make inside walls of a holster of this patent disclosure also will serve such a suction tube holding function.

**[0028]** Figure 6 also suggests a representative method for attaching the holster 36B to a convenient mounting place such as a operating table such as the bar 16 depicted in Figure 1. The holding device for doing this can, for example, be in the form of a C-clamp 68B having a top jaw 68B(1) and a lower jaw 68B(2). A human hand operable hold down bolt 70B is depicted in the lower jaw 68B(2). Its function is to firmly attach the C-clamp 68B to the operating table, e.g., to the operating table bar 16 depicted in Figure 1, during use, but readily allow movement of the C-clamp 68B to a new location on said bar 16 when desired. The C-clamp 68B also can be made rotatable in the manner suggested by rotation arrow 72B. This rotation can, for example, be achieved through use of a bolt 74B that holds a rotatable interface 76B between a C-clamp side 78B and a base plate side 80B of the C-clamp 68B.

**[0029]** Figure 7 depicts yet another embodiment of this invention wherein a holster 36C is provided with a holster mounting device 76C having a lower jaw 76C(1) and an upper jaw 76C(2). In effect, this holding device is a so-called "alligator clip" type holding device. Its lower jaw 74C(1) is shown as being an extension 78C leading from a wall 79C of the holster 36C. The holster mounting device 74C preferably has a top jaw portion 74C(2) that is biased downward by a spring mechanism 80C. A nested array of sacs 84C in the holster 36C is shown provided with a holder 85C for holding down

a nested array 84C of sterile sacs. For example, this holster 36C is shown holding such a nested array of sterile sacs e.g., 84C(1) to 84C(N). The outside bottom surface of the nested array 84C can, for example, be provided with a nub 85C(1) that can be compression fitted in a nub receiver hole such as that depicted by item 85C(2).

**[0030]** In such a nested array, a first (or innermost) sterile sac 84C(1) is nested in a second sterile sac 84C(2) which, in turn, is nested in a third sterile sac and so on to outermost sac 84C(N). In some of the more preferred embodiments of this invention the top of each sac is further provided with a sac sealing/unsealing device such as a Ziploc® device, strips of Velcro® and the like. By way of example, the top ends of the individual sterile sacs, etc. also are respectively shown provided with cooperating sac sealing/unsealing devices 86C(1), 86C(2), etc. Again, such devices could be VELCRO® strips, Ziploc® devices of the type depicted in Figure 5 or any other device suitable for attaching a sheet of soft plastic to a comparable sheet of soft plastic in order to seal the top of such a sac. Such a nested array 84C is so adapted and arranged such that each successive inner sterile sac, etc. can be individually removed from the remainder of the nested array. The individual sacs of this array are also shown provided with one or more sac holding devices such as holes in the sac which engage with a cooperating holding device 88C(1), 88C(2) such as a knob or hook located near the top outside surface of the holster 36C. Thus the entire nested array 84 can be held in place in the holster by such holding devices 88C(1), 88C(2), etc. during use.

**[0031]** Figure 8 depicts another embodiment of this invention wherein a medical nozzle holster 36D has yet another kind of holding device 90D for mounting the holster to an operating room table or other stable structure. This particular mounting device also is made rotatable (as suggested by direction arrow 92D) by virtue of the fact that a base 94D of the rotatable holster mounting device is affixed to

the holding device 90D by a mounting pin 96D that extends through an appropriately sized hole in the base 94D of the holster holding device 90D and through an appropriately sized hole in the mounting device 90D. The mounting pin 96D also can be provided with a pin holder 98D to keep the mounting pin snugly, but hand rotatably, mounted to the base 94D of the holster 36D.

**[0032]** Figure 9 is a side view of a rotatable holster 36E such as that shown in Figure 6. It is intended to show how the holster 36E (and a suction tube 20 contained therein) can be rotated through an angle alpha ( $\alpha$ ) by virtue of a holding device that can rotate with respect to a base. Such a holster 36E preferably rotates in either direction (see two headed direction arrow 100). This rotation allows the handle portion D of the suction tube 20 to be repositioned (from handle position 102D to handle position 104D and back again) according to the wishes of a user (e.g., an anesthesiologist).

**[0033]** Although the preceding disclosure sets forth a number of embodiments of the present invention, those skilled in this art will appreciate that other embodiments, not precisely set forth, could be practiced under the teachings of the present invention. Therefore, the scope of this invention is limited only by the scope of the following claims.